

CLAIMS:

1. An ultrasonic flowmeter for measuring a flow rate of a fluid to be measured, comprising:

5 an ultrasonic transmitter for launching ultrasonic pulses of a prescribed frequency into the fluid to be measured in fluid pipe from an ultrasonic transducer along a measurement line;

a flow velocity distribution measurement means for measuring flow velocity distribution of the fluid to be measured in a measurement region by
10 receiving ultrasonic echoes reflected from the measurement region among the ultrasonic pulses incident into the fluid to be measured; and

a flow rate operation means for calculating a flow rate of the fluid to be measured in the measurement region based on the flow velocity distribution of the fluid to be measured,

15 wherein the ultrasonic transmitter and a receiver for receiving ultrasonic echoes are made to be an ultrasonic transducer integrating a transmitting function and a receiving function of the ultrasonic wave;

wherein a wedge for fixing said ultrasonic transmitter to the outer surface of the fluid pipe for the fluid to be measured is provided; and

20 wherein the distance from said ultrasonic transmitter to the outer surface of the fluid pipe and the distance from the outer surface of the fluid pipe to the inner surface of the fluid pipe through which the ultrasonic wave passes are formed to be an integral multiple of a half-wave length of ultrasonic wave incident into the fluid to be measured.

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2. The ultrasonic flowmeter according to claim 1, wherein a contact

surface with the fluid pipe of the wedge is made equal to the curvature of the fluid pipe.

3. The ultrasonic flowmeter according to any one of claim 1 or claim 2,
5 wherein a distance from the ultrasonic transmitter to the outer surface of the fluid pipe of the wedge is made longer than the distance obtained from multiplying the velocity of the ultrasonic penetrating through the wedge by the time of dead zone the ultrasonic oscillator carries.

10 4. The ultrasonic flowmeter according to any one of claim 1 or claim 3, wherein the material of the wedge from the ultrasonic transmitter and receiver to the outer surface of the fluid pipe is made equal to that of the acoustic impedance of the fluid pipe.

15 5. A wedge used for an ultrasonic flowmeter for measuring a flow rate of a fluid to be measured, said ultrasonic flowmeter comprising:

an ultrasonic transmitter for launching ultrasonic pulses of a predetermined frequency into the fluid to be measured in fluid pipe from an ultrasonic transducer along a measurement line;

20 a flow velocity distribution measurement means for measuring flow velocity distribution of the fluid to be measured in a measurement region by receiving ultrasonic echoes reflected from the measurement region among the ultrasonic pulses incident into the fluid to be measured; and

a flow rate operation means for calculating a flow rate of the fluid to
25 be measured in the measurement region based on the flow velocity distribution of the fluid to be measured,

the ultrasonic transmitter and the receiver for receiving the ultrasonic echoes being integrally formed,

wherein the ultrasonic transmitter and the receiver for receiving ultrasonic echoes are made to be an ultrasonic transducer integrating a transmitting function and a receiving function of the ultrasonic wave;

wherein said wedge comprises:

a fixation unit to fix said ultrasonic transducer to a fluid pipe relating to a fluid to be measured; and

an ultrasonic transmitting unit from the ultrasonic transmitter fixed to the fixation unit to the outer surface of the fluid pipe, and

wherein the distance passing through from the outer surface of the fluid pipe to the inner surface of the fluid pipe is an integral multiple of a half-wave length of incident ultrasonic wave, and the distance from the ultrasonic transmitter to the outer surface of the fluid pipe in the wedge is taken to be an integral multiple of a half-wave length of incident ultrasonic wave.

6. The wedge according to claim 5, wherein a contact surface with the fluid pipe of the wedge is made equal to the curvature of the fluid pipe.

7. The wedge for the ultrasonic flowmeter according to any one of claim 5 or claim 6, wherein the wedge comprises:

a fixation unit for fixing said ultrasonic transmitter to the fluid pipe relating to the fluid to be measured; and

an ultrasonic transmitting unit from the ultrasonic transmitter fixed to the fixation unit to the outer surface of the fluid pipe,

wherein the distance from the ultrasonic transmitter in the ultrasonic transmitting unit to the outer surface of the fluid pipe is made longer than the distance calculated by multiplying velocity with which ultrasonic penetrates through the wedge and the time of dead zone the oscillator of ultrasonic wave carries.

8. The wedge for the ultrasonic flowmeter according to claim 7, wherein the material of the ultrasonic transmitting unit in the wedge is made equal to that of the acoustic impedance of the fluid pipe.